

## NESTABLE CAN TRAY WITH CONTOURED WALL STRUCTURE

#### REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of application Serial No. 29/068,737, filed March 31, 1997, which is incorporated herein by reference.

## BACKGROUND OF THE INVENTION

The present invention relates to a low depth, nestable tray for transporting and storing beverage containers having substantially equal diameters, such as twelve-ounce aluminum beverage cans. Cans for soft drinks, beer and other beverages are often stored and transported during the distribution stages thereof in trays or boxes. These trays or boxes are also used in the retail setting to display the cans, typically in a stack of loaded trays or boxes. Can trays made of plastic are frequently used since they are reusable and recyclable and do not contribute to the solid waste problem of cardboard or paperboard boxes.

Plastic trays wherein the side walls are lower than the height of the stored containers are referred to as low depth trays. Since containers placed in the cases would extend above the side walls, the containers in a lower case support the weight of the other cases stacked on top of them. Metal cans generally have the structural integrity to bear the compressive loads of loaded and stacked trays.

Many prior can trays are configured to be nestable with one another when they are empty to reduce the amount of space they take up during transport back to a wholesaler or bottler. Examples of returnable and reusable can trays are disclosed in U.S. Patent Nos. 4,932,532; 4,823,955; 5,031,774 and 5,445,273. These prior patents are assigned to the same assignee as the present application, and their disclosures are hereby incorporated by reference. The trays disclosed in these prior patents comprise

1 a floor, a band spaced from the floor and a plurality of columns interconnecting the  
2 floor and band. In general, the columns are arranged at the corners and along the end  
3 walls and side walls of the trays.

4 Previous can trays have vertical columns or pillars provided between every two  
5 container rest areas. It has been found that the column and band construction of prior  
6 trays interfere with handling of cans that are bundled together with a secondary  
7 packaging such as an overwrap or paperboard wrap. The corners and the longer side  
8 walls present the most critical areas in which interference with secondary packaging  
9 has been experienced. There is a need for a tray that is structurally sound but whose  
10 construction does not interfere with secondary packaging.

11 Can trays must also have sufficient structural integrity and strength so that the  
12 wall structure can resist spreading or fraying of side wall structures when a large  
13 number of empty trays are nested. The side walls of trays near the bottom of a nested  
14 stack bear more of the weight of the nested stack, and have a tendency to spread or  
15 splay outward. This damage has a cumulative effect and results in a shorter service life  
16 for the trays, and thus additional expense for replacement.

17 Another aspect of can tray construction is the provision of structural supports  
18 for the cans on the floor of the tray to retain the cans in spaced relation to one another  
19 and the wall structure. Excessive jostling of loaded cans can cause damage to the cans  
20 ranging from slight scratches to more severe dents and even ruptures. Simply the  
21 operating vibration of a truck containing the loaded trays can cause damage to the cans  
22 if there is excessive contact and rubbing between the tray walls and the cans.

23 Since can trays that are loaded with cans are stacked on top of one another, can  
24 trays include downwardly extending elements on the bottom of the floor surface to aid  
25 in stable stacking and movement of stacks. These downward elements are arranged  
26 so that some are placed within the top rims of cans in a loaded tray therebeneath, and  
27 others are placed between top rims of adjacent cans in the lower loaded tray.

28 While prior art trays for beverage cans have addressed some of the problems  
29 of can handling and stack stability, typically the results have been trays that are  
30 relatively bulky and heavy which adds to transportation costs and increases the

1 handling burden of handling stacks of loaded trays. There has been a need for a lighter  
2 tray which provides all of the structural features and advantages.

3 **SUMMARY OF THE INVENTION**

4 Accordingly, it is a principal object of the present invention to provide a  
5 nestable, low depth tray for storing, displaying and transporting containers that is light  
6 weight but still provides the necessary structural integrity and strength for repeated use  
7 and handling.

8 Another object of the invention is to provide a wall structure that does not  
9 interfere with secondary packaging over cans.

10 A further object of the present invention is to provide a low depth, nestable tray  
11 which has sufficient structural features to prevent the side walls of the tray from  
12 spreading or fraying due to the weight of trays nested above it.

13 Yet another object of the present invention is to provide a tray that has straight  
14 wall portions at the corners so that the outside dimensions of the tray at both the top  
15 and bottom of the tray are the same to facilitate tray handling by automated equipment.

16 A further object of the present invention is to provide a low depth tray which  
17 is securely supported when loaded and stacked on another loaded tray beneath, but can  
18 easily be moved along the tops of the containers, particularly can tops.

19 A still further object of the present invention is to provide a low depth nestable  
20 tray which makes efficient use of space both when loaded and stacked and when empty  
21 and nested.

22 Another object of the present invention is to provide a low depth, nestable tray  
23 which holds the containers spaced apart from one another and from the wall structure  
24 of the tray to prevent any damage to the containers from excessive contact.

25 Directed to achieving these objects, a new, light weight low depth, nestable tray  
26 for containers is herein provided. The preferred configuration is for single serve sized  
27 cans. This tray is formed by integrally molding from plastic, two basic components --  
28 a wall structure and a floor.

29 The wall structure is contoured, substantially upright and extends around the  
30 periphery of the tray. The wall structure is of a low depth configuration, that is, lower

1 than the tops of the loaded cans, but high enough to prevent the cans from tipping.  
2 The wall structure comprises a band that extends around the periphery and a plurality  
3 of columns that interconnect the band to the floor at certain points. The band is  
4 contoured at a number of points along the periphery of the tray to reduce the number  
5 of columns as compared to the prior art trays which generally have columns at each of  
6 the corners and along the end walls and side walls. The reduction in the number of  
7 columns reduces the weight of the tray and therefore is more economical. The contour  
8 is V-shaped and the band actually connects directly to the floor at those points. The  
9 contoured wall structure provides a lighter tray that can be stacked, nested and handled  
10 in the same way as prior trays and while maintaining the structural integrity of the  
11 heavier trays. Each of the four corners of the tray also has contoured V-shaped walls.  
12 The V-shaped walls, besides reducing the weight of the tray, provide interior surfaces  
13 that do not interfere with secondary packaging around cans, and also ensure that the  
14 top and bottom outside dimensions of the tray are the same.

15 The floor preferably has an open lattice construction which not only allows  
16 unwanted fluids to drain out of the tray, but also requires less material and thus is  
17 lighter than a solid floor design. The floor also has container support areas sized to  
18 receive cans, and includes a shallow groove for engaging the bottoms of cans of  
19 varying bottom rim diameter. The floor of the tray has an outer or bottom surface  
20 which is configured for accommodating the tops of cans in a tray underneath. The  
21 floor bottom surface preferably has two sets of downwardly projecting redoubts, one  
22 set which are located to be disposed within the top rims of cans in a tray therebeneath  
23 and a second set which are located to be disposed between the top rims of adjacent  
24 cans in a tray therebeneath. The redoubts also block a tray from sliding along the tops  
25 of cans in a tray underneath it.

26 These and other features and advantages of the invention may be more  
27 completely understood from the following detailed description of the preferred  
28 embodiments of the invention with reference to the accompanying drawings.

**BRIEF DESCRIPTION OF THE DRAWINGS**

1 FIG. 1 is a top perspective view of a tray in accordance with the present  
2 invention;

3 FIG. 2 is a top plan view of the tray of FIG. 1;

4 FIG. 3 is a bottom plan view of the tray of FIG. 1;

5 FIG. 4 is a side elevational view of the tray of FIG. 1;

6 FIG. 5 is an end elevational view of the tray of FIG. 1;

7 FIG. 6 is a cross-sectional view of the tray taken along line 6-6 of FIG. 2;

8 FIG. 7 is a cross-sectional view of the tray taken along line 7-7 of FIG. 2;

9 FIG. 8 is a cross-sectional view of the tray taken along line 8-8 of FIG. 2;

10 FIG. 9 is a cross-sectional view of the tray taken along line 9-9 of FIG. 2;

11 FIG. 10 is a cross-sectional view of the tray taken along line 10-10 of FIG. 2;

12 and

13 FIG. 11 is a detailed elevational view of a corner of the tray indicated by line  
14 11-11 of FIG. 2.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

15 Referring to FIGS. 1-5, tray 10 of the preferred embodiment comprises a floor  
16 12 and a wall structure comprising a band 14 and columns 16. Columns 16 are  
17 generally arranged between container support areas so that the containers will be  
18 visible between the columns.

19 Floor 12 has an open lattice construction with comprising an array of circular  
20 elements 18 with diamond shaped elements 20 disposed in between the circular  
21 elements. Circular elements 18 and diamond elements 20 are interconnected by struts  
22, 24, 26, 28 that traverse the floor lengthwise, widthwise and in both directions  
23 diagonally, respectively. The circular elements define container support areas 30  
24 arranged in a four-by-six array. For convenience of explanation, the short sides of the  
25 tray will be referred to as the ends and the long sides will be referred to as the sides.  
26 It will be understood throughout the disclosure that the four-by-six size is the preferred  
27 embodiment and any rectangular or square arrangement is contemplated to be within  
28 the scope of the invention.

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1           As best seen in FIGS. 5 and 6, container support areas 30 each define a  
2           container rest comprising an arrangement of grooves 32 provided in the lattice struts  
3           immediately adjoining the circular lattice elements. The grooves will engage the  
4           bottom of a container placed thereon to "seat" the container. These grooves ensure  
5           that the individual containers area properly seated when loaded trays are stacked  
6           together. This positive engagement results in a more stability when handling and  
7           storing stacked loaded trays of cans. In addition, excessive movement of the  
8           containers within a tray is prevented which reduces the risk of damage to the cans.

9           On the bottom surface of the floor, circular elements 18 and diamond elements  
10          20 extend downward slightly relative to the straight struts. This is best seen in FIGS.  
11          1 and 2 where there is a step shown between the bottom of the struts and the bottoms  
12          of the circular and diamond elements. The slight downward extension of these  
13          elements, particularly circular elements 18, results in a locking relationship between the  
14          downward elements or redoubts and the container rims in a lower tray when loaded  
15          trays are stacked with one another. In this manner, stacked loaded trays cannot easily  
16          move relative to one another which is safer for transporting and handling stacked trays.

17          The wall structure of tray 10 is constructed to retain structural integrity and  
18          strength but reduce the amount of material. Less material reduces production costs  
19          and well as transportation costs since the result is lighter weight trays. Band 14  
20          extends along the periphery of the floor and is generally spaced upward from the floor.  
21          In the areas that band 14 is spaced above floor 12, columns 16 interconnect the band  
22          to the floor. Band 14 is substantially smooth along its interior surface which is  
23          generally flat. The interior surface of band 14 is not scalloped in any way so as to  
24          avoid excessive contact with the containers when tray 10 is loaded. Band 14 is flexible  
25          so as to flex upon impact and thereby prevent the containers from being substantially  
26          affected by external forces.

27          To reduce the number of columns and therefore the amount of material used  
28          for the tray, band 14 is angled downwardly from the horizontal or contoured in certain  
29          areas to contact the floor itself. In this preferred embodiment, corner columns have  
30          been eliminated by contouring band 14 downward at the corners of the wall structure

1 into angled V-shaped corner portions 34. As best seen in FIGS. 1 and 11, a  
2 reinforcement rib 36 is provided on the exterior surface of each corner portion 34.  
3 Directly above each reinforcement rib 36 is a nesting platform 38 which supports the  
4 bottom of a corner reinforcement rib in a tray nested above. This reinforced support  
5 of the corners of above-nested trays helps to prevent the side walls from fraying or  
6 splaying outward due to the load of nested trays.

7 One of the advantages of V-shaped corner portions 34 is that this construction  
8 allows the outside dimensions of the tray top and bottom to be the same. FIGS. 2 and  
9 3. That is, the top footprint of the tray is the same as the bottom footprint, there are  
10 no outwardly spread walls as in the prior art. The equal outside dimensions of both the  
11 top and bottom of the tray make handling of the tray by automated equipment easier.

12 The downward slopes of the end wall portion of band 14 and the side wall  
13 portion of band 14 to form corner portions 34 also provides more visibility of the cans  
14 which is advantageous in a retail setting. FIG. 11.

15 More columns are eliminated in the preferred embodiment by contouring band  
16 14 in the center of each of the side walls. FIG. 4. Band 14 along each of the side walls  
17 is contoured downward into V-shaped central portions 40 which connect directly to  
18 floor 12. Each central portion 40 takes the place of a column which is a substantial  
19 reduction in the amount of material comprising the tray. The concave top edge of each  
20 central portion 40 has a nesting surface 42 which is configured to support the bottom  
21 surface 44 of a V-shaped central portion in a nested tray thereabove. In this manner,  
22 contoured central portions 40 of nested adjacent trays are mated together with the  
23 lower tray supporting the upper tray. FIG. 10.

24 In both the corner portions and the central portions, the preferred angle at  
25 which the band angles downward is between 30° and 60°. As used herein,  
26 “contoured” is intended to be a broader term than “angled.” While the V-shaped  
27 portions are shown and disclosed, other suitable shapes for the contoured band are  
28 contemplated to be within the scope of the invention.

29 Another advantage of the V-shaped portions of the walls is that they do not  
30 interfere with secondary packaging around multi-packs of cans. This is a significant

1 benefit when multi-packs are handled since the secondary packaging will not be  
2 damaged.

3 To facilitate handling of the trays, the contoured band portions must be  
4 symmetrically placed so that trays can be easily nested without regard to their  
5 orientation relative to one another.

6 The lower portion of the exterior surface of band 14 has a smooth, downwardly  
7 and inwardly inclined beveled or cam surface 46 along the side walls. FIG. 8. Along  
8 the end walls, the exterior surface of band 14 is provided with ribs 48 that are also  
9 downwardly and inwardly inclined. FIG. 7. These inclined surfaces are important to  
10 preventing the shingling problems of previous trays. The camming surfaces operate  
11 against the a lip or top edge of an adjacent tray and tends to make the tray drop down  
12 without resting on the adjacent top edge. Such beveled surfaces avoids providing a  
13 catch surface that is prevalent in trays that have shingling problems.

14 Columns 16 are spaced around the periphery of the floor and interconnect floor  
15 12 to band 14. The areas between the adjacent columns and between the band and  
16 floor along the sides are open, providing a light weight design allowing for  
17 visualization and display of the containers held in the tray. The column height is that  
18 it is designed to hold the band far enough above the floor of the tray to enable a UPC  
19 code on a can contained in the tray to be read through the space between the columns.  
20 The height of columns 16 is sufficient enough to prevent the containers from tipping  
21 when transported and handled, and low enough so that the tops of the containers  
22 extend above band 16 and a stack of nested trays take up minimal vertical space.

23 The exterior surfaces of columns 16 include slots 50 which also define the  
24 inward surfaces 52 of the columns. FIGS. 4 and 9. Slots 50 are configured to receive  
25 inward surfaces 52 of the columns of a tray nested above. Inward surfaces 52 are  
26 generally vertical and preferably have three angled faces which mate in the  
27 corresponding slots with mating angled surfaces. Columns 16 must be substantial  
28 enough to support band 14 so that the tray does not break apart when the containers  
29 push against the band. The columns preferably have the pyramidal design shown in the  
30 drawings allowing them to have the largest area at their bottoms and thus making it

1 unlikely that they will be torn away from the floor in the event of a severe impact. By  
2 placing columns 16 between the container support areas excessive contact with the  
3 containers during normal tray handling, and any resultant damage, is avoided.

4 When the trays are nested, since nesting platforms 38 support ribs 36 at the  
5 corners of the tray, end walls and side walls are relieved of the nested load and  
6 consequently are not as prone to splaying outward or fraying. Thus the trays of the  
7 present invention maintain their structural integrity and will have a longer service life.  
8 Moreover, controlling the spreading or fraying of the wall structures lessens the  
9 chances of shingling.

10 The tray of the present invention is contemplated to be used with loose cans  
11 as well as those wrapped or otherwise bound into six-packs or twelve-packs. The  
12 floor and wall structures are constructed so that they will not interfere with wraps or  
13 other binding means around multi-packs of cans.

14 The preferred embodiment of the present invention comprises downward  
15 contours of the band at the corners and in the central area of the side walls, but any  
16 configuration of columns and downward contours are contemplated to be within the  
17 scope of the invention. As long as the desired strength of the tray is maintained, any  
18 number of the columns may be eliminated and replaced with downward contours as  
19 disclosed herein.

20 From the foregoing detailed description, it will be evident that there are a  
21 number of changes, adaptations, and modifications of the present invention which  
22 come within the province of those skilled in the art. However, it is intended that all  
23 such variations not departing from the spirit of the invention be considered as within  
24 the scope thereof as limited only by the claims appended hereto.